

Edición n°1 | mayo de 2026 | set.usm.cl

IN-SET

BOLETÍN DE VIGILANCIA TECNOLÓGICA

RENEWABLE ENERGY

Resumen de la actualidad tecnológica en transición energética, que recoge tendencias en energías renovables, almacenamiento y materiales, combustibles sostenibles, procesos térmicos y de combustión, infraestructura eléctrica e inteligencia artificial, así como su aplicación en los distintos sectores de consumo.

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El Centro Tecnológico Nacional para la Innovación en Transición Energética Sostenible, **SET-Chile** por sus siglas en inglés, tiene como misión desarrollar, validar y transferir soluciones tecnológicas que respondan a los desafíos de la transición energética. Para ello, impulsa la innovación y promueve la articulación entre la academia, la industria, el Estado y los territorios.

ET-Chile cuenta con un sistema de Vigilancia Tecnológica destinado a monitorear periódicamente el horizonte tecnológico en las áreas críticas de cada una de sus líneas estratégicas de trabajo. Esta primera edición inicia un ciclo de boletines informativos enfocados en los avances tecnológicos clave para la transición energética, en **Energías renovables** que abarca ámbitos como la generación de electricidad renovable, la energía térmica, la agrivoltaica, así como los electrolizadores y sus materiales de fabricación.

Esta edición, centrada en **Sistemas y Materiales de Almacenamiento de Energías Renovables**, se destacan los avances en sistemas de almacenamiento de aire comprimido (CAES); una patente de la Singapore Management University sobre plataformas agregadoras *Vehicle-to-Grid* (V2G), orientadas a la integración bidireccional entre vehículos eléctricos y redes inteligentes; y una solicitud de patente de la multinacional alemana Bosch relacionada con un sistema de gestión térmica basado en sensores virtuales para estimar el estado de carga y la salud de módulos integrados de almacenamiento de energía térmica.

En el ámbito del hidrógeno, se incluyen investigaciones del Centro de Investigación de Jülich (Alemania) sobre tecnologías *Liquid Organic Hydrogen Carrier* (LOHC) basadas en residuos biogénicos, junto con proyectos desarrollados por el *Future Energy Exports CRC* de Australia, enfocados en la licuefacción criogénica de hidrógeno para la exportación energética.

En cuanto a nuevos materiales, los materiales de alta entropía (HEM) emergen como una frontera prometedora para sectores como el aeroespacial, la energía nuclear, el hidrógeno verde y los sistemas de almacenamiento energético. Asimismo, se presentan estudios basados en *machine learning* orientados a acelerar el descubrimiento de *Metal-Organic Frameworks* (MOFs) aplicados al almacenamiento de hidrógeno.

Finalmente, destacamos el simposio "Avances en materiales estructurales y funcionales de alta entropía: síntesis, procesamiento y rendimiento", que se realizará en Boston, Massachusetts, entre el 29 de noviembre y el 4 de diciembre de 2026.

ÍNDICE

NOTICIAS

- 03 Sweet-LOHC: The Next Generation of Chemical Hydrogen Storage
- 03 Lithium-air batteries break performance barriers thanks to a newly developed 2D catalyst
- 04 Review finds depleted oil and gas reservoirs could store hydrogen at scale
- 04 Electrified Thermal Energy Storage (eTES): Turning Renewable Energy into System Flexibility
- 04 New strategy addresses persistent problem in next-generation solid-state batteries

PUBLICACIONES CIENTÍFICAS

- 05 Assessment of various hydrogen storage options and electrofuels for smart energy systems
- 05 The impact of buffer tank size on explicit flexibility in residential buildings: A model predictive control analysis
- 06 Grid-interactive real-time HVAC optimization in a commercial building with thermally activated slabs
- 06 Accelerating discovery of MOFs for hydrogen storage via machine learning in energy related applications
- 06 Mn and Au redox mediators in ZnCl_2 water-in-salt electrolytes: Implications for Zn-ion battery chemistry
- 07 Research progress on high-entropy anode materials for alkali metal ion batteries

PATENTES

- 08 High-performance organosulfur cathode materials for lithium-sulfur batteries
- 08 Virtual Sensors for Estimating State of Charge and State of Health in Thermal Energy Storage
- 09 New compressed air energy storage system
- 09 Electronic aggregator platform of Vehicle-to-Grid

PROYECTOS

- 10 Successful test of grid frequency stabilization with German battery storage
- 10 PUSH-IT
- 11 Future Energy Exports CRC – Development & demonstration of hydrogen liquefaction – Core Research Interim Report
- 11 PEACE-ZABs Perovskite Efficient Advanced Catalysts for Energy - Zinc Air Batteries
- 11 GeoSUSTAIN – Sustainable Medium-Depth Geothermal Solutions with Solid Media Thermal Energy Storage for H/C
- 12 HyCavern Advancing Hydrogen Storage in Lined Rock Caverns – From Materials to Market

MERCADO

- 13 Long-duration energy storage deployments rose 49% in 2025: WoodMac
- 13 What Are the Latest Technology Trends and Industry Outlook for Lithium-Sulfur Batteries, a...13

ÍNDICE

EVENTOS

- 14  Symposium SF01-Advances in Structural and Functional High-Entropy Materials—Synthesis, Processing and Performance
- 14  Battery & Energy Storage Tech Europe 2026

REPORTES

- 15  Battery Circularity
- 15  Compressed Air Energy Storage: A Case Study

NORMATIVAS

- 16  European Union: REMIT II Explained

NOTICIAS

Edición n°1 | mayo de 2026 | set.usm.cl

Sweet-LOHC: The Next Generation of Chemical Hydrogen Storage

Etiqueta: Chemical hydrogen storage | Publicada el 17/04/2026

Liquid organic hydrogen carriers are set to become even more sustainable. In a new research focus at the Institute for a Sustainable Hydrogen Economy (IHE), researchers at Forschungszentrum Jülich are investigating storage molecules made from biogenic waste that offer additional advantages.

[ver más...](#)

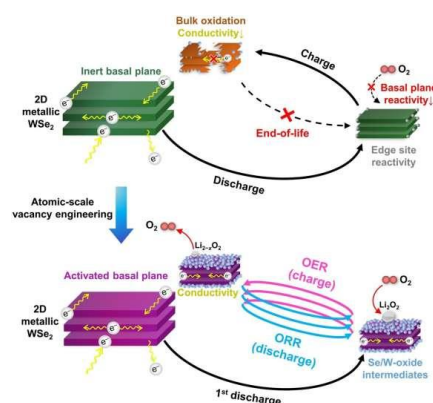


Lithium-air batteries break performance barriers thanks to a newly developed 2D catalyst

Etiqueta: Lithium-air cathodes | Publicada el 01/04/2026

A joint research team led by Dr. Jeong Sohee from the Center for Extreme Materials Research at Korea Institute of Science and Technology and Dr. Lee Kwang-hee from the Advanced Materials Processing Center at the Institute for Advanced Engineering (IAE) has successfully developed a catalyst technology that maximizes the surface activity of the two-dimensional nanomaterial tungsten diselenide (WSe_2).

[ver más...](#)

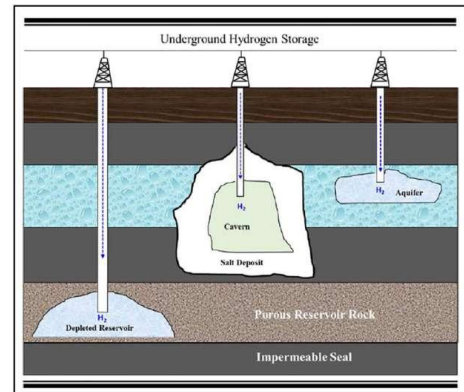


Review finds depleted oil and gas reservoirs could store hydrogen at scale

Etiqueta: Depleted reservoirs | Publicada el 04/03/2026

A new review published in Renewable and Sustainable Energy Reviews highlights several advantages of using depleted reservoirs for hydrogen storage, including reduced development costs due to existing wells and infrastructure, as well as detailed geological data collected during previous hydrocarbon production.

[ver más...](#)

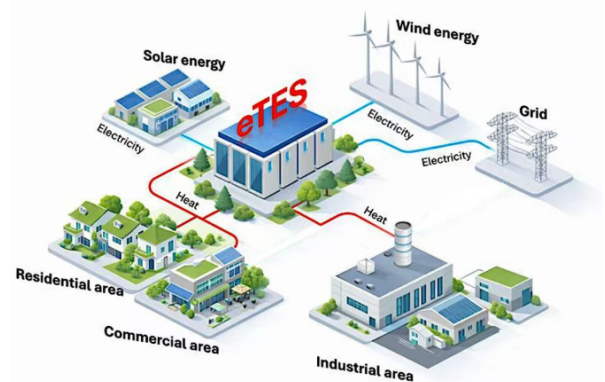


Electrified Thermal Energy Storage (eTES): Turning Renewable Energy into System Flexibility

Etiqueta: Thermal energy storage | Publicada el 12/01/2026

Most thermal energy storage (TES) research still focuses on thermally charged systems, storing waste heat or renewable heat such as that from solar collectors. Yet directly electricity-charged TES is rapidly emerging as a powerful and still underappreciated solution for a renewable-dominated grid.

[ver más...](#)



New strategy addresses persistent problem in next-generation solid-state batteries

Etiqueta: Solid electrolytes | Publicada el 06/01/2026

Brown University engineers showed that applying a temperature gradient across a solid-state electrolyte blocks destructive dendrite growth, offering a practical solution to a major barrier in battery technology.

[ver más...](#)



PUBLICACIONES CIENTÍFICAS

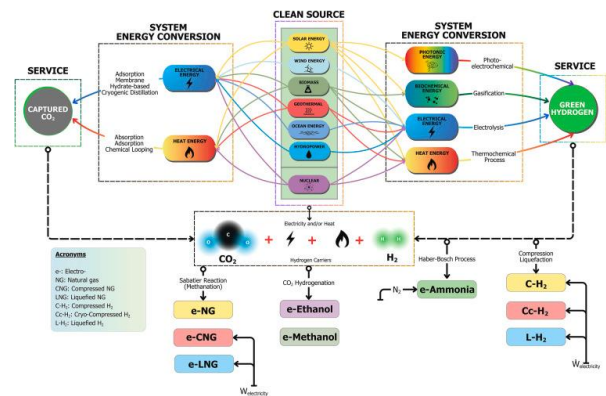
Edición n°1 | mayo de 2026 | set.usm.cl

Assessment of various hydrogen storage options and electrofuels for smart energy systems

Etiqueta: Physical hydrogen storage | Publicada el 22/04/2026

This study aims to evaluate the performance of hydrogen storage both in physical forms and as chemical hydrogen carriers via electrofuels (e-fuels), and to compare their hydrogen storage capacities and overall energy conversion efficiencies with direct hydrogen storage options within power-to-X systems.

[ver más...](#)

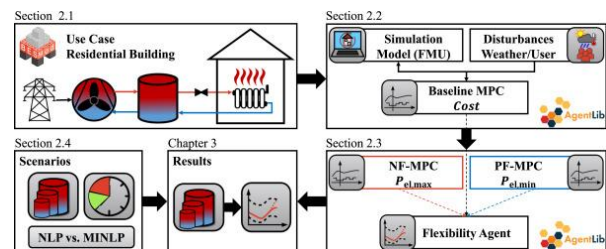


The impact of buffer tank size on explicit flexibility in residential buildings: A model predictive control analysis

Etiqueta: Load shifting and flexibility | Publicada el 21/04/2026

The increasing adoption of renewable energy and heat pumps strains electrical grids, creating opportunities for residential buildings to provide demand-side flexibility through participation in emerging flexibility markets. This paper investigates how the size of a thermal buffer tank impacts a building's ability to offer explicit flexibility, defined by the amount of shiftable energy and its specific activation cost.

[ver más...](#)

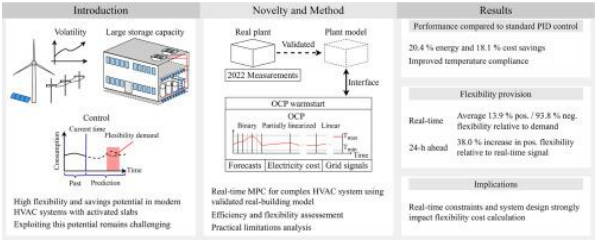


Grid-interactive real-time HVAC optimization in a commercial building with thermally activated slabs

Etiqueta: Grid-interactive buildings | Publicada el 15/04/2026

While model predictive control (MPC) has been widely studied for improving building performance, real-time implementations that quantify both efficiency and flexibility under practical operational and implementation constraints for complex HVAC systems remain largely unexplored. Therefore, this study presents a real-time-capable MPC application using mixed-integer linear programming (MILP) for a complex all-electric HVAC system with thermally activated concrete slabs, evaluated using a validated simulation model.

[ver más...](#)

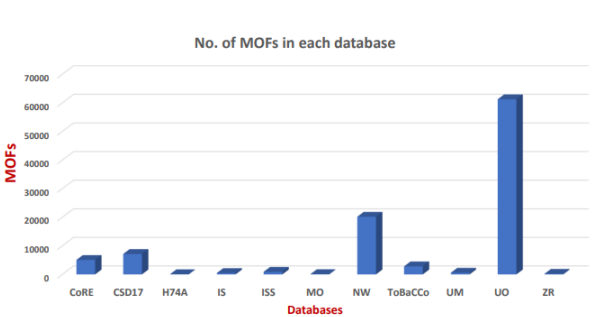


Accelerating discovery of MOFs for hydrogen storage via machine learning in energy related applications

Etiqueta: Metal-organic frameworks (MOFs) | Publicada el 18/03/2026

This work combines Grand Canonical Monte Carlo (GCMC) simulations with machine learning, employing Feed-Forward (FNN) and Pattern Recognition (PRNN) neural networks optimized via Equilibrium Optimizer and Genetic Algorithm. The integrated approach predicts gravimetric and volumetric hydrogen storage capacities across 98,695 metal-organic frameworks under temperature-pressure swing conditions.

[ver más...](#)

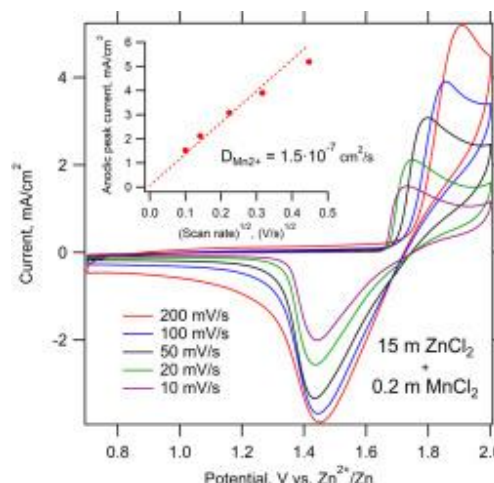


Mn and Au redox mediators in ZnCl_2 water-in-salt electrolytes: Implications for Zn-ion battery chemistry

Etiqueta: Redox mediators | Publicada el 22/02/2026

Redox mediators in water-in-salt electrolytes (WiSE) offer a compelling platform for durable, safe, and efficient Zn-ion battery. This study investigates two model systems: MnCl_2 and HAuCl_4 dissolved in 15 m ZnCl_2 . Using a carbon positive electrode enables areal capacities of approx. 1 mAh/cm^2 , outperforming traditional electrodes with solid thin-film materials, e.g., phosphate olivines.

[ver más...](#)

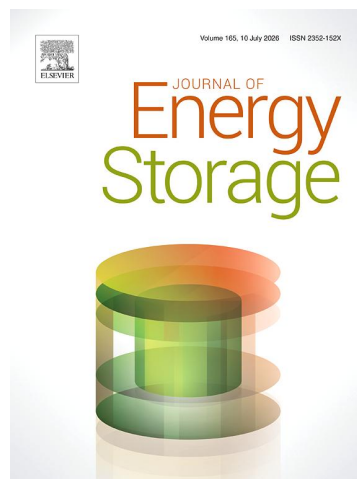


Research progress on high-entropy anode materials for alkali metal ion batteries

Etiqueta: High entropy alloys (HEAs) | Publicada el 09/01/2026

This article comprehensively reviews the application of High-entropy materials (HEMs) in the anodes of alkali-metal batteries, detailing the basic concepts, four core effects, and common types of HEMs. It comprehensively elaborates on the research progress in their application as anodes in alkali metal batteries, including their performance in different alkali metal battery systems such as lithium, sodium, and potassium.

[ver más...](#)



PATENTES

Edición n°1 | mayo de 2026 | set.usm.cl

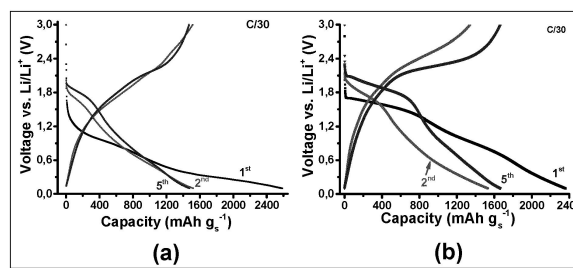
High-performance organosulfur cathode materials for lithium-sulfur batteries

Etiqueta: Lithium-sulfur cathodes | Publicada el 29/04/2026

The current invention is concerned with sulfurized vinyl aromatic polymers including sulfurized poly(styrene) (SPS) and sulfurized poly(vinylpyridine) (SPVP) and their use as cathode active materials for lithium-sulfur (Li-S) batteries. Respective Li-S batteries are fabricated from cathodes using SPS and SPVP, respectively, a lithium metal foil anode, an electrolyte, and a separator. The current invention is further concerned with cathodes, which comprise respective sulfurized vinyl aromatic polymers, electrochemical cells, which comprise respective cathodes and batteries and battery packs, which comprise respective electrochemical cell, as well as the use of the batteries and battery packs for energy storage.

[ver más...](#)

Figure 1: Formation cycles at C/30-rate of (a) SPS- and (b) SPVP-based Li-S cells.

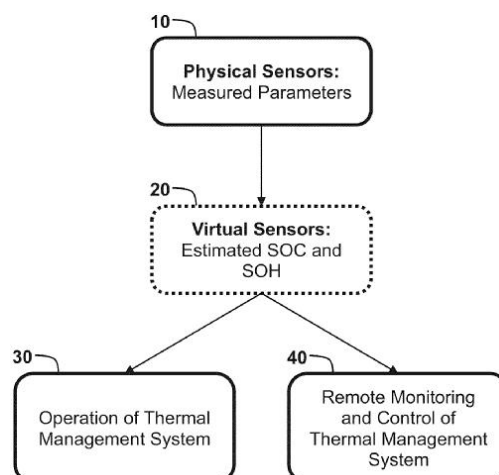


Virtual Sensors for Estimating State of Charge and State of Health in Thermal Energy Storage

Etiqueta: Thermal energy storage | Publicada el 23/04/2026

A thermal management system is disclosed that provides virtual sensors that estimate the state of charge and/or the state of health of an integrated thermal energy storage module. Physical sensors of the thermal management system measure values of a plurality of parameters of the thermal management system.

[ver más...](#)



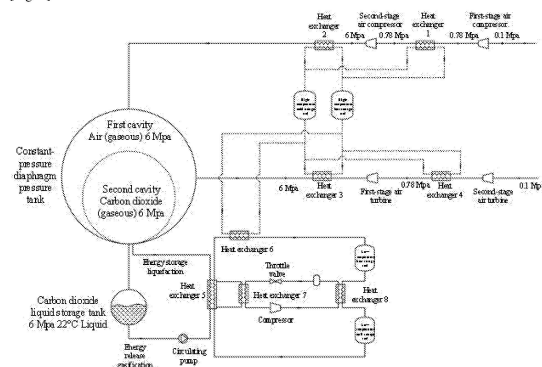
New compressed air energy storage system

Etiqueta: CAES (Compressed Air Energy Storage) | Publicada el 02/04/2026

The present invention discloses a new compressed air energy storage system, including a constant-pressure diaphragm pressure tank, an air compression and energy release subsystem, and a working medium gas vapor-liquid conversion subsystem.

[ver más...](#)

[Fig. 1]



Electronic aggregator platform of Vehicle-to-Grid

Etiqueta: Vehicle-to-grid (V2G) | Publicada el 22/01/2026

An electronic platform, method and system for facilitating discharge of an electric vehicle (EV) battery into an electricity grid as part of a vehicle-to-grid (V2G) scheme uses an EV model module (e.g., a manufacturer database) to store participation criteria for EV models.

[ver más...](#)

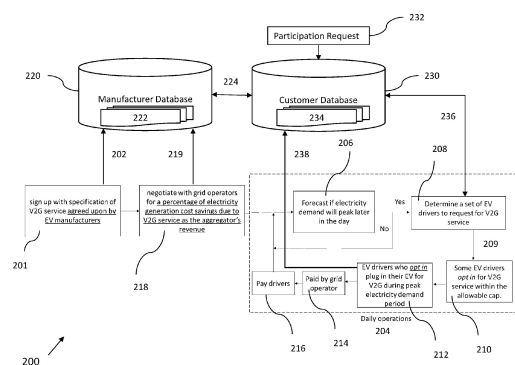


Figure 2A

PROYECTOS

Edición n°1 | mayo de 2026 | set.usm.cl

Successful test of grid frequency stabilization with German battery storage

Etiqueta: BTES (Borehole Thermal Energy Storage) | Publicada el 27/04/2026

Westnetz, one of the largest distribution system operators (DSO) for electricity in Germany, has completed the first successful test involving the 21 MW / 55 MWh large-scale battery energy storage system (BESS) from the "SUREVIVE" research project. The battery storage unit is designed to actively stabilize the power system, maintaining constant frequency and voltage even during fluctuations.



[ver más...](#)

PUSH-IT

Etiqueta: UTES (Underground Thermal Energy Storage) | Publicada el 08/04/2026

PUSH-IT's ambition is to overcome the seasonal mismatch between heat demand and heat generation from sustainable sources using underground heat storage. The EU-funded project aims to demonstrate the full-scale application of high temperature heat storage in geothermal reservoirs using three different technologies at six different sites.

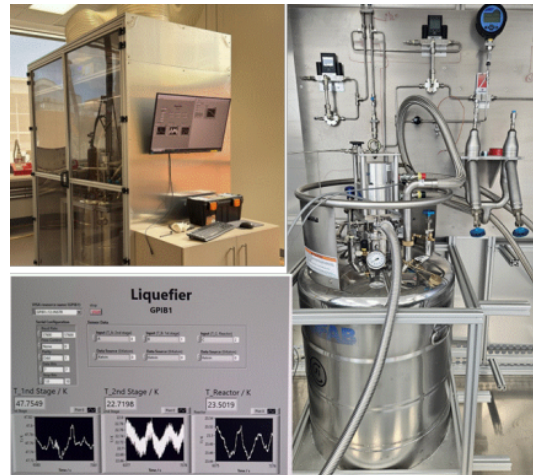


[ver más...](#)

Future Energy Exports CRC – Development & demonstration of hydrogen liquefaction – Core Research Interim Report

Etiqueta: Hydrogen liquefaction | Publicada el 01/04/2026

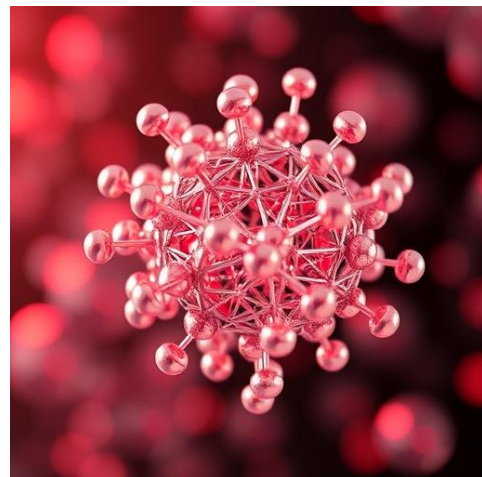
The project reports progress across three research areas aimed at reducing the cost and improving the safety of hydrogen liquefaction: development of mixed refrigerant liquefaction capability, improved thermodynamic and fluid dynamic modelling tools for cryogenic hydrogen, and updated safety models for hydrogen release scenarios. Activities completed to date include commissioning a small scale liquefaction loop, advancing the design of an industrially relevant mixed refrigerant system, generating new datasets on cryogenic hydrogen behaviour, and conducting experiments to characterise hydrogen release and air condensation effects.

[ver más...](#)

PEACE-ZABs Perovskite Efficient Advanced Catalysts for Energy - Zinc Air Batteries

Etiqueta: High entropy alloys (HEAs) | Publicada el 30/03/2026

The PEACE-ZAB project aims to accelerate the discovery of lanthanum-based High-entropy perovskite oxides (HEPOs) for Zinc-air batteries (ZABs) using machine learning (ML) on high-throughput experimental data. The project will (i) explore HEPO compositional spaces with reduced critical raw material content, (ii) elucidate the relationships between composition, structure, and electrochemical performance (OER/ORR activity and stability in acidic/alkaline electrolytes) through ML-assisted analysis, and (iii) transfer the most promising candidates to industrial production with startup Nano4Energy.

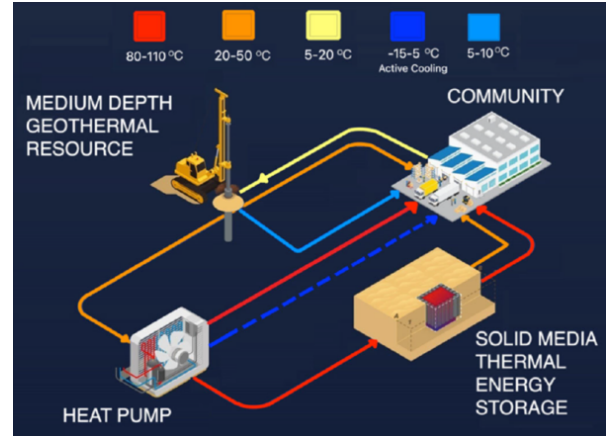
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GeoSUSTAIN – Sustainable Medium-Depth Geothermal Solutions with Solid Media Thermal Energy Storage for H/C

Etiqueta: Thermal energy storage | Publicada el 04/02/2026

The GeoSUSTAIN project aims to develop an efficient, zero-emission geothermal-based solution for industrial heating and cooling. This project will focus on integrating medium-depth geothermal system with underground solid media thermal energy storage to provide scalable, flexible, and cost-effective technological solutions for heating and cooling purposes.

[ver más...](#)



HyCavern Advancing Hydrogen Storage in Lined Rock Caverns – From Materials to Market

Etiqueta: Geological storage | Publicada el 01/01/2026

HyCavern develops and validates a next-generation underground hydrogen storage system based on lined rock caverns (LRCs), combining engineered lining systems, advanced materials and real-time safety monitoring to ensure safe long-term storage at industrial scale.

[ver más...](#)



MERCADO

Edición n°1 | mayo de 2026 | set.usm.cl

Long-duration energy storage deployments rose 49% in 2025: WoodMac

Etiqueta: Long-duration energy storage | Publicada el 10/03/2026

Global long-duration energy storage deployments rose 49% in 2025, exceeding 15 GWh, according to Wood Mackenzie's latest report on the subject. Ninety-three percent of cumulative installations are in China, driven by its strong national and provincial government support for technologies capable of economical discharge at maximum power for longer than four hours, according to the report.

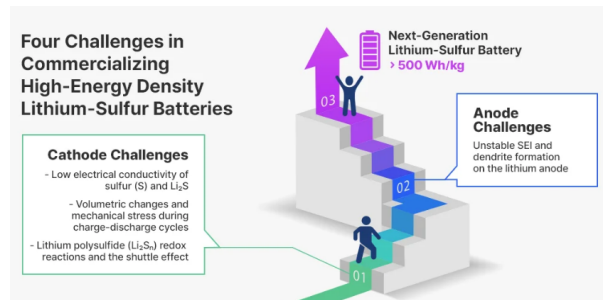


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What Are the Latest Technology Trends and Industry Outlook for Lithium-Sulfur Batteries, a Key Next-Generation Battery Technology?

Etiqueta: Lithium-sulfur cathodes | Publicada el 06/02/2026

Lithium-sulfur batteries are rapidly emerging as strong competitors to lithium-ion batteries in energy storage. They offer a theoretical energy density of 2,600 Wh/kg and have the potential to reach 500 Wh/kg in practical cells. In addition, their advantages—including abundant raw materials, cost competitiveness, low environmental impact, lightweight design, and long-duration operation as rechargeable batteries—are being increasingly highlighted.



[ver más...](#)

EVENTOS

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Symposium SF01-Advances in Structural and Functional High-Entropy Materials—Synthesis, Processing and Performance

Etiqueta: High entropy alloys (HEAs) | Publicada el 10/04/2026

Technological advances are innately linked to the discovery of novel materials, so continuous improvement of structural and functional materials is essential for next-generation technologies in aerospace, nuclear energy, green hydrogen, and energy storage systems. High-entropy materials (HEMs) are an exciting new frontier for these applications.

November 29 - December 4, 2026

Boston, Massachusetts



[ver más...](#)

Battery & Energy Storage Tech Europe 2026

Etiqueta: Battery Energy Storage Systems (BESS) | Publicada el 02/02/2026

Battery & ES Tech Europe 2026 runs 8th & 9th September 2026 at Fira Barcelona. The event is an industry scaling platform for stationary & industrial battery new applications in Europe, designed to accelerate the maturity and growth of an industrial ecosystem.



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REPORTES

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Battery Circularity

Etiqueta: Battery Energy Storage Systems (BESS) | Publicada el 29/04/2026

This report provides new evidence on global innovation trends for technologies related to battery recycling. Based on the EPO's unique and comprehensive worldwide patent databases and the IEA's expert insights into the key issues for battery technologies, the report presents the very latest data as a guide to decision makers from the public and private sectors.

[ver más...](#)

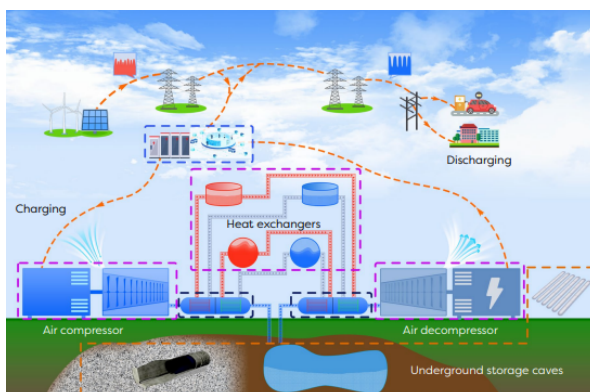


Compressed Air Energy Storage: A Case Study

Etiqueta: CAES (Compressed Air Energy Storage) | Publicada el 01/01/2026

To maximize the contribution of variable renewable energy sources, longduration storage is critical, since variable sources, notably wind and solar, often generate excess power at off-peak times. The successful Yingcheng compressed air energy storage project in China is presently the world's largest—and the first of its kind to operate without the use of supplemental fuels. With a five-hour discharge at full capacity of 300 MW, the project is a breakthrough for long-duration storage technology at such scale.

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NORMATIVAS

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European Union: REMIT II Explained

Etiqueta: Battery Energy Storage Systems (BESS) | Publicada el 23/04/2026

Regulation (EU) 2024/1106 ("REMIT II") and its new Implementing Regulation, entering into force on 29 April 2026, significantly expands and intensify the EU wholesale energy market transparency regime. The revised framework affects a wide range of market participants, including electricity and gas traders, balancing service providers, energy storage operators, hydrogen producers and offtakers, as well as large or diversified trading portfolios.

[ver más...](#)

